

US EPA ARCHIVE DOCUMENT

CASE GS0178

GLYPHOSATE

STUDY 17

4-22-85

PM 25 06/16/83

CHEM 103601

Isopropylamine glyphosate

BRANCH EFB

DISC 30 TOPIC

FORMULATION 90 - FORMULATION NOT IDENTIFIED

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Edwards, W.M. 1975. Field runoff of glyphosate from Coshocton watersheds. In Determination of residues of glyphosate and its metabolite in aquatic use of Roundup herbicide.

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CONCLUSION:

Mobility - Leaching and Adsorption/Desorption

This runoff study could not be validated because pretreatment and immediate posttreatment soil samples were not analyzed to confirm glyphosate application rates. In addition, this study would not fulfill EPA Data Requirements for Registering Pesticides because the method was not one of the three (i.e., soil TLC, soil columns, batch equilibrium) recommended for determining pesticide mobility in soils, complete soil characteristics were not presented, and the formulation of the test substance was not reported.



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MATERIALS AND METHODS:

Ohio Watersheds 103 (0.65 A, silt loam soils with 11.3% slope, alfalfa-orchardgrass cover) and 123 (1.37 A, silt loam soils with 5.8% slope, no-till corn cover) were treated on April 18 and April 27, 1973, respectively, with glyphosate (Roundup, MON 2139, 3 lb/gal, formulation and source unspecified), at 3 lb ai/A. Runoff samples were collected on April 27, May 10, June 4, 6, and 17, August 14, October 8, and October 31. Soil samples (0- to 2-inch sampling depth) were taken pretreatment from Watersheds 103 and 123 on April 30 and May 9, respectively, and thereafter from both Watersheds on June 14, July 9, and August 6.

Glyphosate and the degradate aminomethylphosphonic acid were determined in the runoff water by passing the water through anion and cation exchange columns to clean up the samples and separate the parent from the degradate. The parent and degradate were then acylated with trifluoroacetic acid and trifluoroacetic anhydride, and methylated with diazomethane. The glyphosate and aminomethylphosphonic acid derivatives were quantified by GC using a flame photometric detector. Recovery values for six water samples fortified with glyphosate at 2.5 or 5.0 ppb ranged from 55.7 to 100% and from 49.2 to 100%, respectively. The detection limit was 2.5 ppb. Recovery values for aminomethylphosphonic acid ranged from 54.9 to 94.8% and from 57.3 to 98.8%, respectively, for water samples fortified with 2.5 and 5.0 ppb.

REPORTED RESULTS:

Less than 0.2% of the applied, for both sites, was detected in the runoff (Table 1). Of the glyphosate detected in the runoff from both sites, essentially 100% of the recovered was detected in the first two runoff events. Aminomethylphosphonic acid was detected at a maximum concentration of 27 and 19 ppb from the first runoff events of Watersheds 103 and 123, respectively.

DISCUSSION:

1. Because pretreatment and immediate postapplication soil samples were not analyzed, the extent of glyphosate mobility in runoff could not be accurately assessed.
2. It was reported that soil samples were collected, but glyphosate and aminomethylphosphonic acid concentration data in soil were not reported.
3. The method was not one of the three (i.e., soil TLC, soil columns, batch equilibrium) recommended for determining pesticide mobility in soils.

4. Complete soil characteristics, including textural analysis, pH, organic matter content, and CEC, were not reported.
5. The recoveries of glyphosate and aminomethylphosphonic acid from fortified water samples varied from 49 to 100% and 55 to 98%, respectively. It was not reported whether data were corrected for recoveries.

Table 1. Glyphosate and aminomethylphosphonic acid concentrations (ppb) in runoff water of two Ohio watersheds following treatment with glyphosate (Roundup, 3 lb/gal) at 3 lb ai/A.

Sampling interval (days)	Runoff collected (liters)	Glyphosate		Degradate ^a (ppb)
		(ppb)	(% of applied)	
<u>Ohio Watershed 103</u>				
9	9,208	70	0.09	27
22	30,985	12	0.05	<10
47	2,873	5	0.002	8
49	7,751	3	0.00	7
60	1,617	4	--	<4
118	635	NDC	--	NDC
Total	53,069 ^b		<0.15	
<u>Ohio Watershed 123</u>				
10	37,871	73	0.15	19
35	2,620	11	0.002	12
37	2,690	4	<0.001	7
48	14,577	ND	--	ND
106	1,100	ND	--	ND
160	1,100	ND	--	ND
184	11,042	ND	--	ND
Total	71,000		<0.16	

a Aminomethylphosphonic acid.

b Equivalent runoff volume = 0.794 inches.

c Not detected; detection limit was 2.5 ppb.

d Equivalent runoff volume = 0.504 inches.